



U.S. Department of the Interior • Bureau of Mines

MINERAL INDUSTRY SURVEYS

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COBALT IN OCTOBER 1993

U.S. cobalt consumption in October decreased 4% from consumption in September, according to the U.S. Bureau of Mines (USBM). However, cobalt consumption for the first 10 months of 1993 was essentially unchanged from consumption during the same period in 1992. Domestic data on U.S. cobalt consumption and stocks are developed by the USBM from voluntary surveys of U.S. operations. The data in tables 1 through 3 contain estimates to account for nonrespondents and are subject to revision. Approximately 4,446 metric tons of cobalt metal and cobalt contained in chemicals were imported during January through September, as compared with 4,370 metric tons imported during the first 9 months of 1992. Exports of cobalt-containing materials during January through September included 574 metric tons of unwrought cobalt and cobalt contained in chemicals, as compared with 1,226 metric tons exported during the same period in 1992. Trade data for October will be available in a subsequent issue.

Recent USBM Publication.--The USBM recently issued two special reports that include sections on cobalt. "Chemical Industry Applications of Industrial Minerals and Metals" is a compilation of brief reviews for nearly 50 commodities. Each review gives a general background on the commodity, followed by a discussion of how it is used by the chemical industry, and an outlook section. The second report, "Recycled Metals in the United States," provides salient facts, scrap sources, recovery methods, scrap prices and markets, and an outlook for nearly 25 metals. Single copies of these reports are available free of charge as supplies last. For further information, please contact Kim B. Shedd (U.S. Bureau of Mines, Mail Stop 5208, 810 7th St., NW, Washington, DC 20241) or the U.S. Bureau of Mines Branch of Production and Distribution, Cochrans Mill Road, P.O. Box 18070, Pittsburgh, PA 15236.

USBM Research.--The USBM has successfully demonstrated an upgrading process for National Defense Stockpile (NDS) cobalt. Researchers at the USBM Salt Lake City, UT, Research Center conducted three 120-hour test campaigns with USBM-developed cobalt upgrading technology. The objective was to economically upgrade NDS cobalt to meet the most stringent Department of Defense (DOD) specification, P13-R6 grade A. A key feature of the upgrade process is a novel double membrane electrolytic cell (DMEC). The upgrade process involves three principal steps: 1) electrochemical dissolution of cobalt in DMEC anode

Prepared in the Branch of Metals and the Branch of Data Collection and Coordination, December 17, 1993.

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compartments, 2) anolyte purification by hydrometallurgical means, and 3) deposition of high-purity cobalt cathodes from purified anolyte in DMEC cathode compartments. The DMEC cathode assayed greater than 99.9% cobalt and quantities of 29 impurity elements were below the maximum levels allowed in P13-R6 grade A cobalt. For further information please contact: Lorin Redden, Salt Lake City Research Center, (801) 584-4100.

Update--On December 9, the DLA awarded 181,955 pounds of cobalt at \$10.608 per pound to Minor Metals, Inc., of Fort Lee, NJ,--46,703 pounds under category A and 135,252 pounds under category B. The next sale of cobalt rondelles is scheduled for December 22, 1993, and the next sale of cobalt granules is scheduled for January 12, 1993.

Price update, dollars per pound of electrolytic cobalt (Source--Platt's Metals Week):

<u>Week ending</u>	<u>Price range</u>	<u>Week ending</u>	<u>Price range</u>
November 12	11.40-11.80	November 26	11.40-11.80
November 19	11.40-11.80	December 3	10.75-11.25

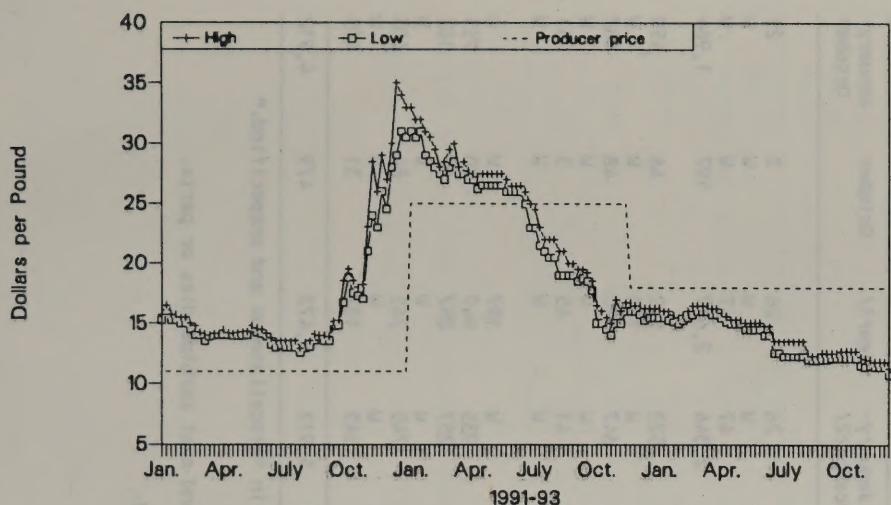
Monthly Average

November

11.64

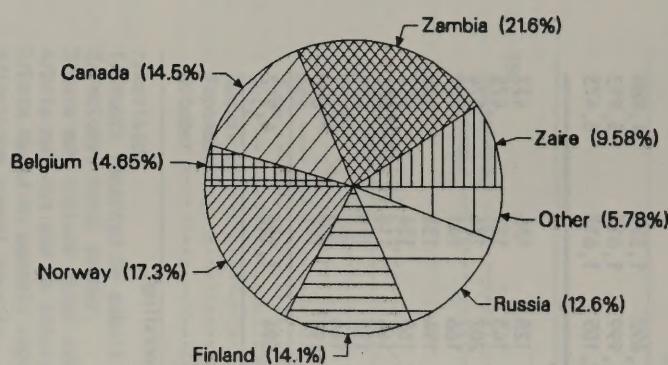
WEEKLY CATHODE PRICE RANGES

(Platt's Metals Week)

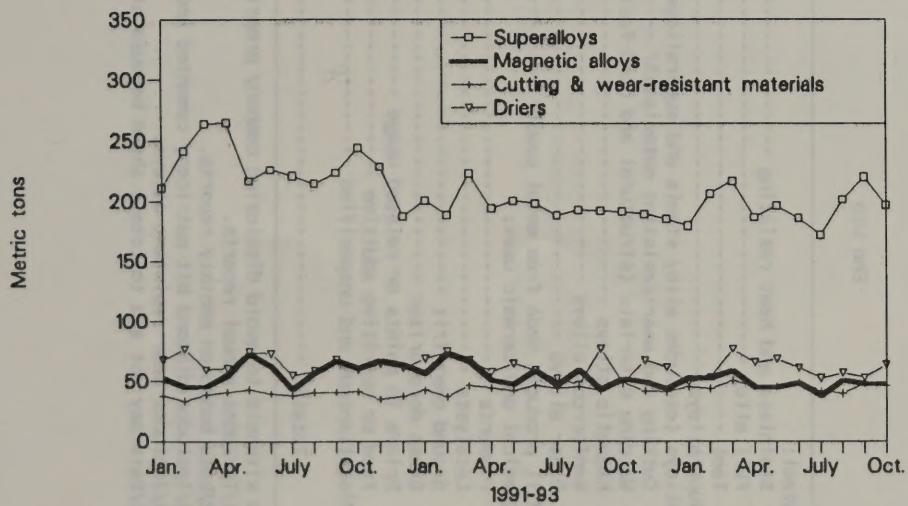


U.S. IMPORTS FOR CONSUMPTION

(October 1992 - September 1993)



CONSUMPTION BY SELECTED END USE



COBALT CONSUMPTION, IMPORTS, STOCKS

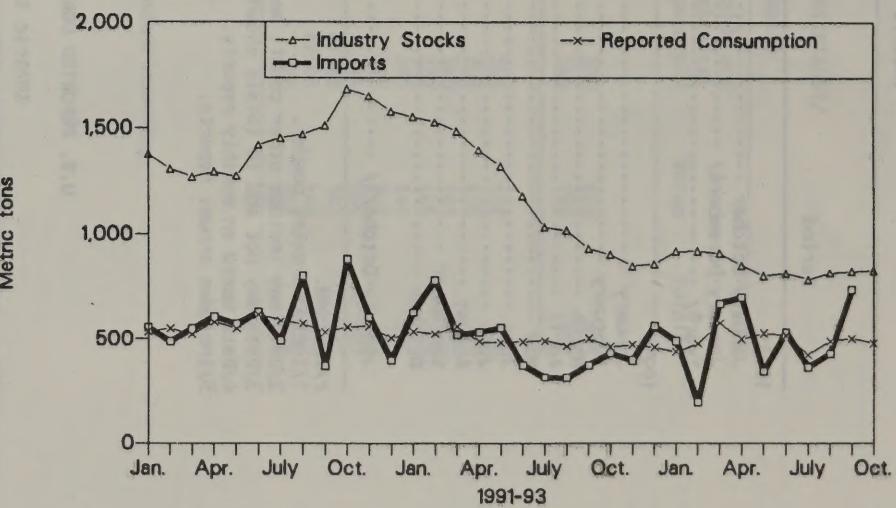


TABLE 1
U.S. REPORTED CONSUMPTION OF COBALT MATERIALS

(Metric tons, contained cobalt)

Period	Metal1/	Oxide and other chemical compounds2/	Scrap	Total3/
1992:				
January-October -----	1,933	1,692	1,355	4,980
January-December4/ -----	2,300	1,999	1,613	5,912
Year5/ -----	2,755	2,105	1,613	6,473
1993:				
January -----	174	128	135	437
February -----	205	143	127	475
March -----	236	202	136	574
April -----	191	166	141	497
May -----	193	194	138	525
June -----	195	165	154	514
July -----	159	144	118	421
August -----	216	151	119	488
September -----	r/229	146	126	r/501
October -----	197	155	127	479
January-October3/ -----	1,996	1,594	1,322	4,912

r/Revised.

1/Includes metal powder.

2/Data may include other cobalt materials.

3/Data may not add to totals shown because of independent rounding.

4/Data based on monthly reports.

5/Includes annual reports.

TABLE 2
U.S. REPORTED CONSUMPTION OF COBALT, BY END USE

(Metric tons, contained cobalt)

End Use	1992		1993	
	January-October	January-December2/	Year1/	October
Steel:				
Stainless and heat resisting -----	22	26	26	3
Full alloy -----	W	W	W	W
Tool -----	W	47	47	W
Superalloys -----	1,971	2,346	2,697	197
Alloys (excludes alloy steels and superalloys):				
Cutting and wear-resistant materials3/ -----	439	522	522	46
Welding materials (structural and hard-facing)4/ -----	W	W	130	W
Magnetic alloys -----	554	647	670	48
Nonferrous alloys -----	W	W	W	W
Other alloys -----	35	41	45	3
Mill products made from metal powder -----	W	W	W	W
Chemical and ceramic uses:				
Pigments -----	W	W	197	W
Catalysts -----	802	935	949	70
Ground coat frit -----	218	257	257	17
Glass decolorizer -----	W	W	W	W
Driers in paints or related usage -----	616	745	745	64
Feed or nutritive additive -----	W	W	W	W
Miscellaneous and unspecified -----	325	345	187	31
Total5/ -----	4,980	5,912	6,473	479
				4,912

W Withheld to avoid disclosing company proprietary data; included in "Miscellaneous and unspecified."

1/Includes annual reports.

2/Data based on monthly reports.

3/Includes diamond bit matrices, cemented and sintered carbides, and cast carbide dies or parts.

4/Includes wear-resistant alloys.

5/Data may not add to totals shown because of independent rounding.

TABLE 3
U.S. REPORTED STOCKS OF COBALT MATERIALS¹
(Metric tons, contained cobalt)

	Metal ² /	Oxide and other chemical compounds ³ /	Scrap	Total ⁴ /
1992:				
December ⁵ /	365	338	153	855
Yearend ⁶ /	400	344	153	897
1993:				
January -----	415	355	147	918
February -----	378	363	178	919
March -----	388	340	181	909
April -----	371	332	145	849
May -----	352	301	148	801
June -----	342	309	163	814
July -----	311	314	156	781
August -----	r/341	r/310	162	r/813
September -----	r/354	r/306	162	r/822
October -----	349	320	156	826

r/Revised.

1/Stocks reported by cobalt processors and consumers.

2/Includes metal powder.

3/Data may include other cobalt materials.

4/Data may not add to totals shown because of independent rounding.

5/Data based on monthly reports.

6/Includes annual reports.

TABLE 4
U.S. IMPORTS FOR CONSUMPTION OF COBALT, BY COUNTRY

(Kilograms, gross weight of material, except as noted)

Period and country of origin	Metal ^{1/}		Oxides and hydroxides		Salts and compounds ^{2/}		Total cobalt content for the month ^{4/}	Cobalt content, year-to- date ^{4/}
	Quantity	Value ^{3/}	Quantity	Value ^{3/}	Quantity	Value ^{3/}		
1992:								
September -----	310,778	\$15,899,273	42,940	\$2,021,204	115,836	\$773,865	371,114	4,369,895
October -----	407,138	15,968,206	25,016	1,060,410	19,386	198,669	430,818	4,800,713
November -----	349,330	14,129,731	30,910	1,335,149	83,431	982,132	394,664	5,195,377
December -----	542,759	20,220,767	16,258	535,660	23,431	271,223	561,033	5,756,410
Year total -----	5,273,700	246,392,982	430,891	18,650,833	628,649	7,777,957	XX	XX
1993:								
January -----	455,400	17,047,415	34,728	1,152,076	25,039	303,479	487,742	487,742
February -----	163,382	5,986,651	43,385	1,202,032	3,000	41,445	195,370	683,111
March -----	606,550	20,519,475	51,491	1,718,422	91,106	864,871	668,489	1,351,600
April -----	672,677	23,161,290	22,970	632,184	27,216	329,702	698,016	2,049,616
May -----	302,921	10,580,368	27,452	895,717	65,457	608,228	341,862	2,391,478
June -----	5/496,303	5/16,699,147	36,115	1,166,170	5/29,704	5/255,630	530,490	2,921,968
July -----	5/285,370	5/7,866,851	68,498	2,136,956	5/97,774	5/815,526	361,846	3,283,814
August -----	330,160	9,670,135	31,920	787,018	257,440	2,202,604	427,139	3,710,953
September:								
Belgium -----	6,333	414,853	3,000	61,050	--	--	8,493	193,657
Brazil -----	--	--	--	--	--	--	--	425
Canada -----	64,594	1,646,119	5/2	5/6,084	3,195	28,809	66,065	551,054
China -----	--	--	--	--	--	--	--	1,440
Finland -----	27,000	969,251	5/24,680	5/533,057	200,800	1,540,538	98,986	675,268
France -----	3,131	266,437	--	--	--	--	3,131	28,932
Germany -----	11,680	680,489	--	--	--	--	11,680	96,428
Japan -----	46	1,556	--	--	--	--	46	14,897
Norway -----	95,000	2,452,004	--	--	--	--	95,000	708,230
Russia -----	25,871	688,237	2,000	42,977	--	--	27,311	483,688
South Africa, Republic of ---	500	13,338	--	--	--	--	500	38,739
United Kingdom -	--	--	--	--	--	--	--	68,383
Zaire -----	83,076	2,632,005	5/41,658	5/1,092,946	--	--	113,070	513,535
Zambia -----	310,600	6,578,517	--	--	--	--	310,600	1,049,461
Other -----	--	--	--	--	--	--	--	21,700
Total -----	627,831	16,342,806	71,340	1,736,114	203,995	1,569,347	734,882	4,445,837

XX Not applicable.

1/Unwrought cobalt, excluding alloys; includes cobalt cathode and cobalt metal powder.

2/Includes cobalt sulfates, cobalt chlorides, cobalt carbonates, and cobalt acetates.

3/Customs value.

4/Estimated from gross weights.

5/All or part of these data have been referred to the Bureau of the Census for verification.

Source: Bureau of the Census.

TABLE 5
U.S. IMPORTS FOR CONSUMPTION OF ADDITIONAL COBALT MATERIALS, BY COUNTRY

(Kilograms - gross weight of material)

Period and country of origin	Unwrought cobalt alloys		Other cobalt: matte, waste and scrap ^{1/}		Wrought cobalt and cobalt articles	
	Quantity	Value ^{2/}	Quantity	Value ^{2/}	Quantity	Value ^{2/}
1992:						
January -----	7,243	\$226,184	49,209	\$689,492	4,516	\$286,976
February -----	18,889	582,933	122,134	2,004,420	8,836	553,048
March -----	1,061	21,932	56,344	660,195	30,162	1,545,383
April -----	7,644	263,754	59,239	956,694	4,896	496,071
May -----	2,247	79,748	5,958	123,053	28,706	1,325,418
June -----	7,216	331,121	31,599	376,267	6,990	609,808
July -----	4,277	109,237	52,703	600,290	7,014	618,836
August -----	7,076	271,212	35,871	376,454	3,701	535,620
September -----	1,997	115,783	67,006	826,691	2,668	406,325
October -----	7,663	317,245	73,567	535,794	10,744	728,059
November -----	2,427	106,532	17,564	194,663	8,618	525,305
December -----	21,932	653,204	12,492	115,265	13,716	976,858
Total -----	89,672	3,078,885	583,686	7,459,278	130,567	8,607,707
1993:						
January -----	77,299	1,701,387	6,360	52,472	12,197	778,395
February -----	4,585	167,487	15,786	189,374	7,315	579,991
March -----	15,444	473,239	20,104	213,694	16,844	791,983
April -----	6,383	267,667	23,295	345,700	8,231	568,733
May -----	8,847	302,883	42,549	444,921	21,155	962,327
June -----	6,768	273,544	35,338	411,816	12,083	596,124
July -----	12,664	417,417	38,000	492,791	23,899	756,123
August -----	872	46,126	3/44,836	3/262,697	11,096	614,159
September:						
Canada -----	* 23	1,800	--	--	1,032	90,853
France -----	--	--	1,500	2,611	40	9,517
Germany -----	227	9,275	--	--	--	--
Japan -----	--	--	23,577	167,030	6,466	294,249
Russia -----	--	--	3/15,960	3/98,889	--	--
Sweden -----	1,324	32,136	--	--	--	--
Switzerland -----	--	--	8,621	9,194	--	--
United Kingdom -----	3,022	58,029	13,691	233,245	4,508	140,958
Zaire -----	--	--	3/17,600	3/239,522	--	--
Other -----	--	--	--	--	83	10,531
Total -----	4,596	101,240	80,949	750,491	12,129	546,108

1/Includes other intermediate products of cobalt metallurgy; may include other cobalt-bearing materials from which cobalt is extracted, or from which cobalt-containing chemical compounds are manufactured.

2/Customs value.

3/All or part of these data have been referred to the Bureau of the Census for verification.

Source: Bureau of the Census.

TABLE 6
U.S. EXPORTS OF COBALT MATERIALS

(Kilograms, gross weight of material, except as noted)

Unwrought cobalt, powders, matte, waste and scrap ^{1/}			Oxides and hydroxides		Salt and compounds ^{2/}		Total cobalt content for the month ^{4/}
	Quantity	Value ^{3/}	Quantity	Value ^{3/}	Quantity	Value ^{3/}	
1992:							
January -----	25,883	\$813,037	98,869	\$1,327,579	135,820	\$853,978	129,848
February -----	29,861	1,438,122	252,608	2,533,886	84,682	641,596	232,465
March -----	36,251	1,456,393	89,449	957,431	58,422	841,358	114,949
April -----	69,940	3,690,770	307,623	726,089	60,349	227,641	306,238
May -----	86,304	5,256,331	64,145	920,428	86,578	575,178	153,731
June -----	27,804	873,166	35,227	576,555	61,644	574,657	68,337
July -----	31,047	1,067,500	29,829	1,032,524	60,649	745,812	67,208
August -----	23,678	706,358	34,611	816,817	55,766	640,961	62,226
September ---	65,062	1,241,894	14,470	352,143	62,549	248,277	90,857
October -----	28,381	1,464,129	18,923	480,859	91,243	1,141,444	64,372
November -----	14,965	650,013	26,558	913,893	95,350	969,261	57,469
December -----	38,169	1,331,242	32,643	1,197,246	43,698	269,597	72,462
Total -----	477,345	19,988,955	1,004,955	11,835,450	896,750	7,729,760	1,420,162
1993:							
January -----	25,003	1,084,910	22,018	579,024	68,365	368,687	57,897
February -----	30,629	1,066,001	16,764	479,512	65,701	451,031	58,940
March -----	56,801	1,520,368	45,227	974,389	93,196	687,032	112,231
April -----	35,499	1,171,759	28,340	667,664	5/75,345	5/563,631	r/74,273
May -----	39,710	798,244	14,313	324,339	58,078	384,809	64,355
June -----	19,646	525,352	37,468	794,003	68,260	496,370	63,422
July -----	10,618	398,001	50,242	634,166	32,741	266,800	54,771
August -----	6/33,372	6/517,227	6/11,148	6/232,151	36,955	255,897	50,268
September ---	24,286	631,095	6712,998	6/264,865	15,832	135,837	37,448
Total -----	275,564	7,712,957	238,518	4,950,113	514,473	3,610,094	573,605

r/Revised.

1/May include other intermediate products of cobalt metallurgy, and unwrought cobalt alloys.

2/Cobalt acetates and cobalt chlorides.

3/Customs value.

4/Estimated from gross weights.

5/Data revised by the Bureau of the Census.

6/All or part of these data have been referred to the Bureau of the Census for verification.

Source: Bureau of the Census.

TABLE 7
U.S. EXPORTS OF WROUGHT COBALT, COBALT ORES, AND CONCENTRATES

(Kilograms, gross weight of material)

	Wrought cobalt and cobalt articles		Cobalt ores and concentrates	
	Quantity	Value ^{1/}	Quantity	Value ^{1/}
1992:				
January -----	78,432	\$1,706,055	3,913	\$35,213
February -----	13,057	754,382	--	--
March -----	32,580	911,059	--	--
April -----	37,041	1,621,812	--	--
May -----	39,920	2,022,516	--	--
June -----	36,322	1,179,644	--	--
July -----	15,061	558,069	--	--
August -----	18,887	823,997	--	--
September -----	60,246	972,614	--	--
October -----	17,920	869,429	2,458	47,419
November -----	41,307	1,117,638	--	--
December -----	13,847	674,964	5,202	168,102
Total -----	404,620	13,212,179	11,573	250,734
1993:				
January -----	30,203	1,300,214	--	--
February -----	6,894	573,995	--	--
March -----	5,310	418,346	--	--
April -----	57,639	1,366,279	--	--
May -----	14,758	985,083	--	--
June -----	38,138	1,007,852	--	--
July -----	16,815	1,898,641	2/410	2/4,050
August -----	11,451	643,114	--	--
September -----	15,750	906,591	2/149,456	2/77,279
Total -----	196,958	9,100,115	149,866	81,329

1/Customs value.

2/All or part of these data have been referred to the Bureau of the Census for verification.

Source: Bureau of the Census.

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